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(71) Applicant(s):  
Sears Manufacturing Company  
(Incorporated in USA - Iowa)  
1718 S Concord Street, Davenport,  
Iowa 52808, United States of America

(72) Inventor(s):  
Dennis J. Gryp  
Ryan Morris  
Daniel Burns

(74) Agent and/or Address for Service:  
A A Thornton & Co  
235 High Holborn, LONDON, WC1V 7LE,  
United Kingdom

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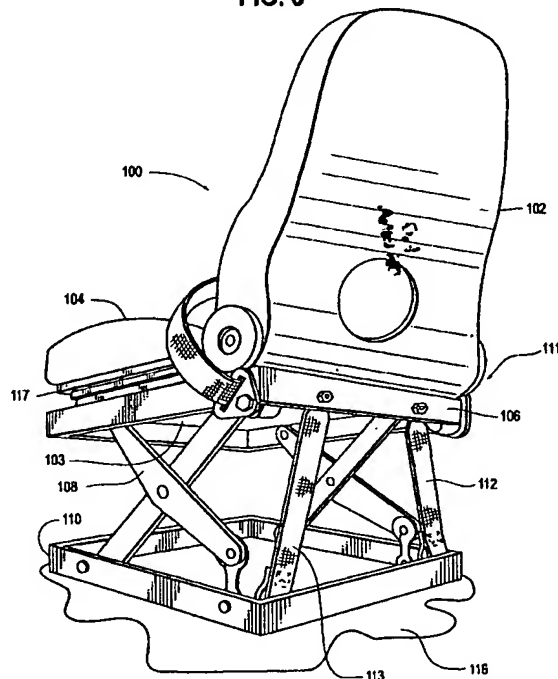
(56) Documents Cited:  
EP 0881116 A2 EP 0530439 A2  
US 6264163 B1 US 6036266 A  
US 5799922 A US 4448386 A  
US 3957304 A

(58) Field of Search:  
UK CL (Edition W) A4L  
INT CL<sup>7</sup> B60N  
Other: EPODOC, WPI, JAPIO

(54) Abstract Title: Internal vehicle seat anchor

(57) A vehicle seat comprising a base 110 and a seat frame 111 connected to one another by a damper and at least one flexible member 112, 113. The seat frame 111 may comprise a back portion 102, a seat portion 103 and an upper base portion 106. The back portion and/or the seat portion may be made of a lighter material than the base and may also be made from magnesium.

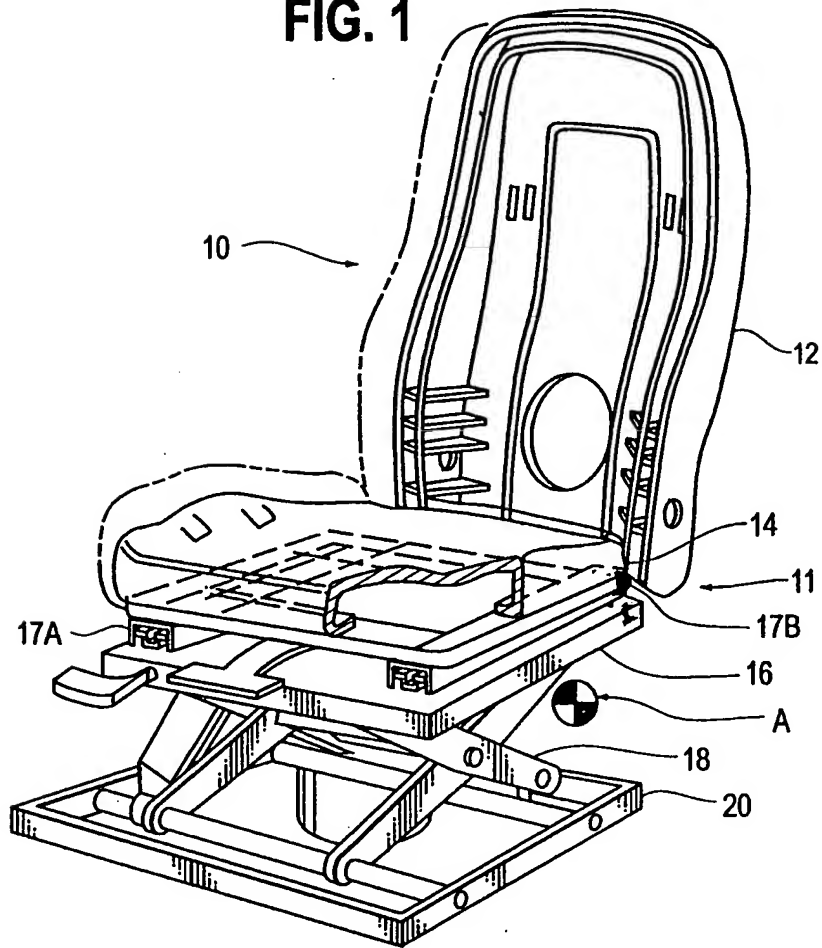
FIG. 3



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**FIG. 1**



**FIG. 2**  
PRIOR ART

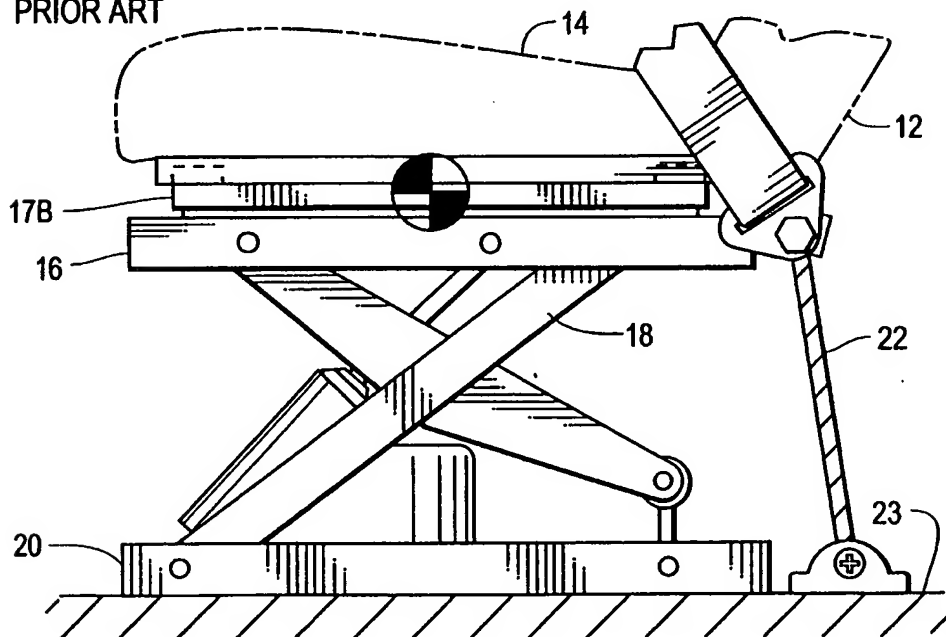


FIG. 3

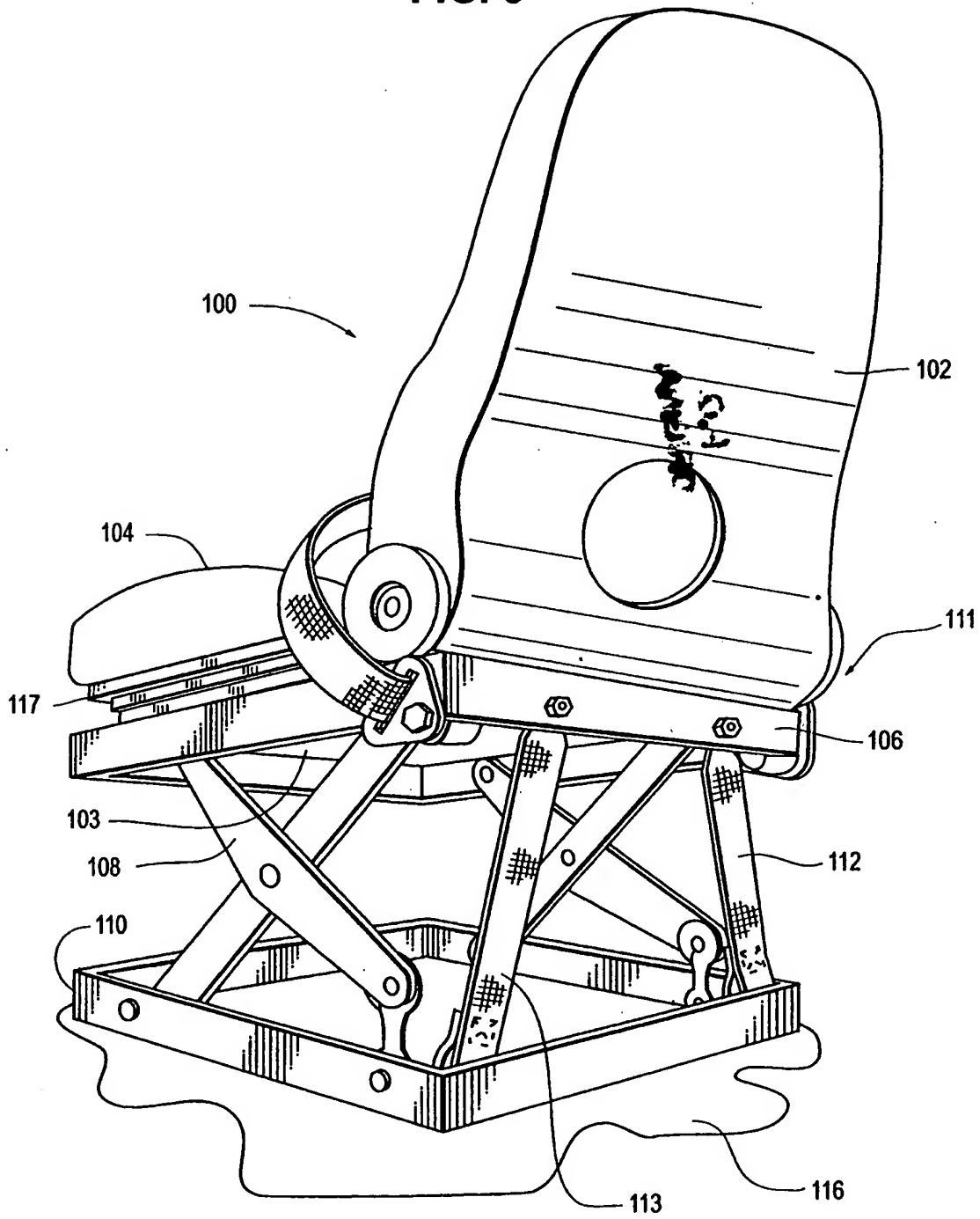


FIG. 4

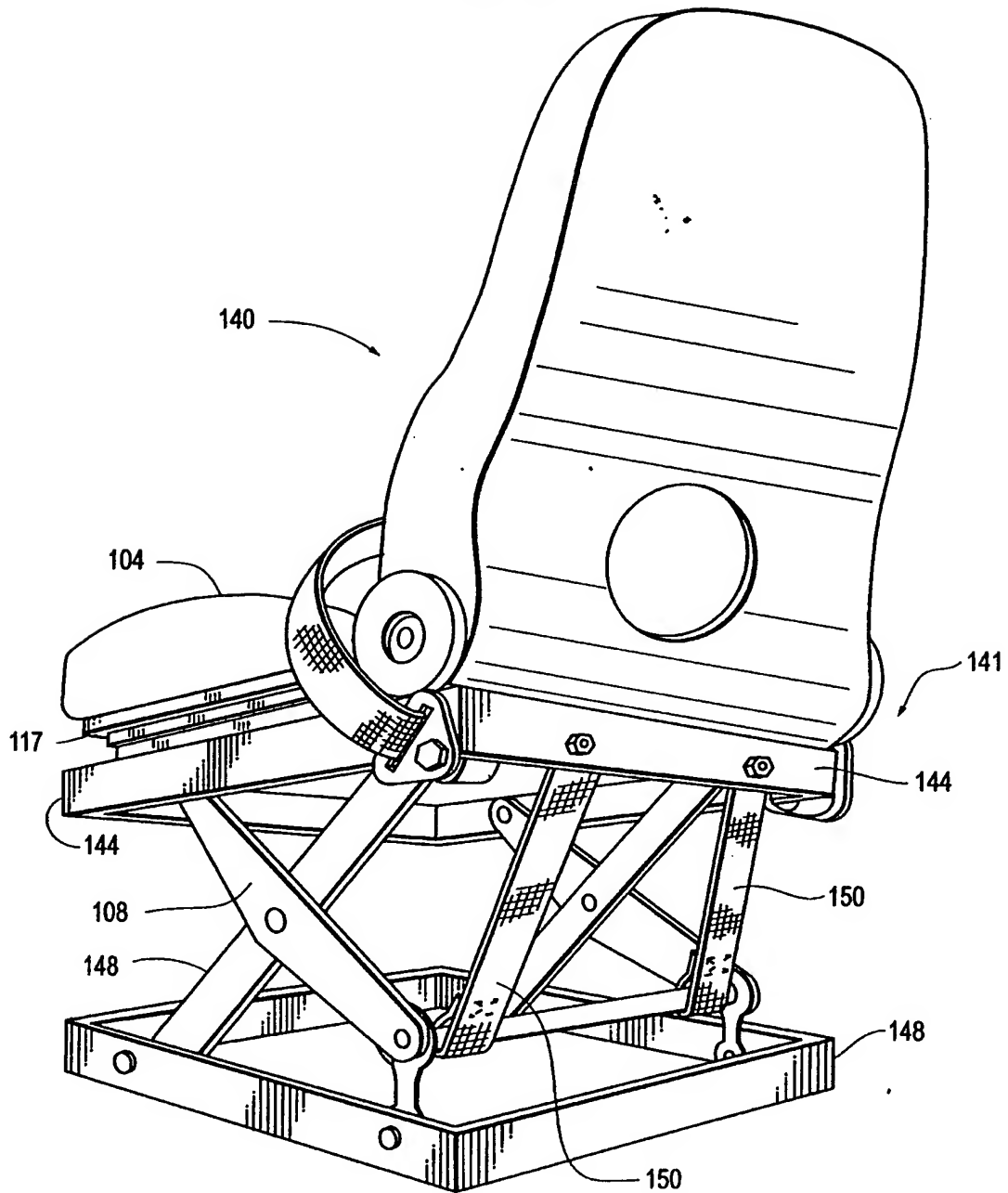
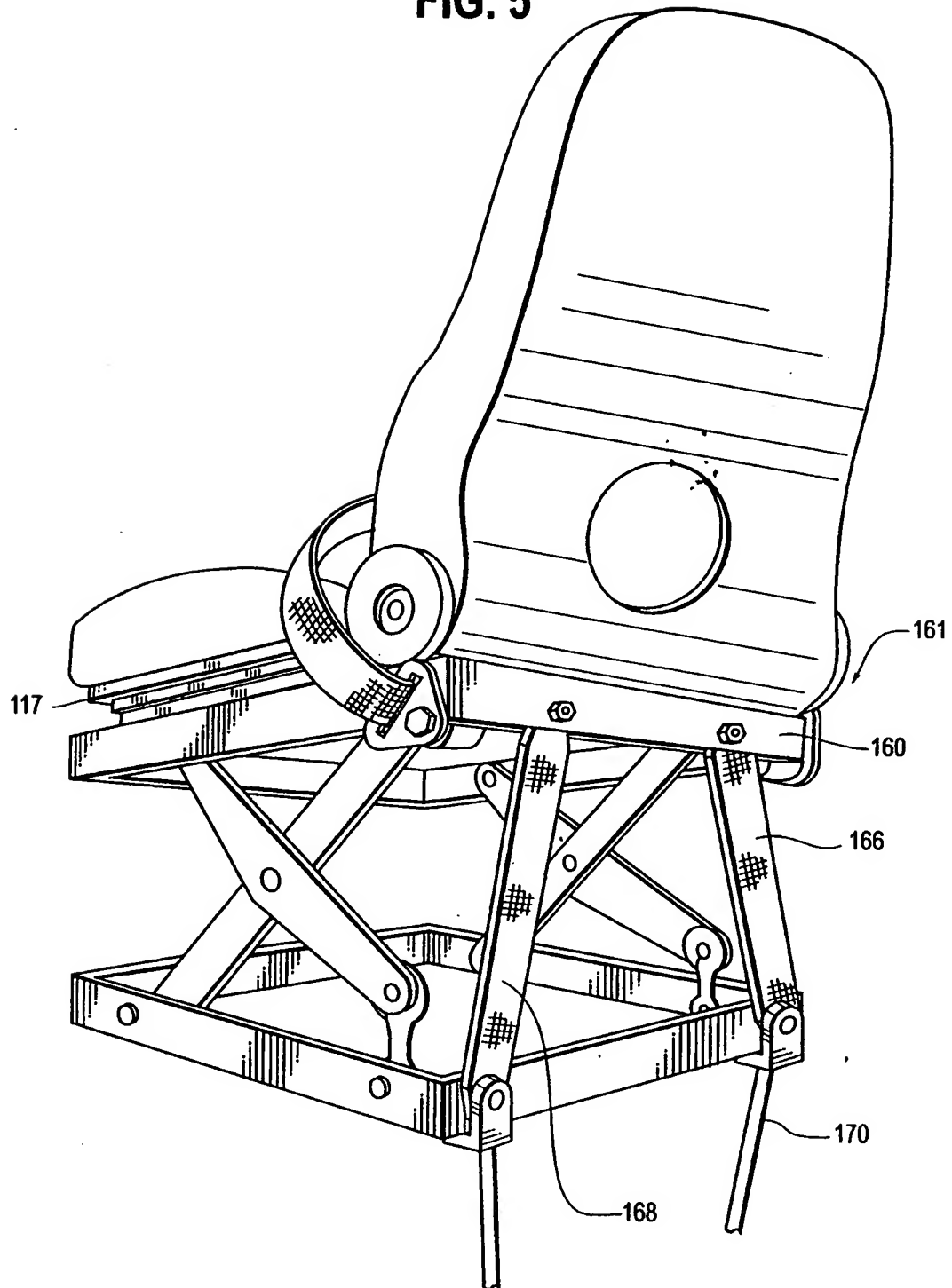


FIG. 5



**Background of the Invention**

The present invention relates to a novel vehicle seat. More specifically, the present invention concerns a vehicle seat in which restraints, tie-downs or anchors may be internally coupled to seat components rather than to other portions of a vehicle.

**Summary Of The Invention**

In typical seating systems used in vehicles such as trucks and tractors, straps or tie-downs are often used as an anchor or a restraint to connect the seat to the vehicle floor so as to provide an additional safety feature that holds the seat in place in the event of an unforeseen force. To insure that seats are properly designed to withstand such unforeseen forces, pull tests are often used which are well known to those of skill in the art. These tests assist in the design of safer seats. However, when designing seats that are capable of meeting existing standards, certain limitations are often encountered. For example, most seat components, including the seat pan and back pan are made of metal. The use of metal parts results in the center of mass being located approximately at or above sliders which are often used with the seat. This results in the sliders of the seat needing to meet pull test standards. This is not an economically feasible option since it would drastically increase the cost of this component. Instead, one or more anchors or tie-down straps are often used with one end of the strap affixed

to the vehicle and with the other end attached to the seat frame. The use of a restraint in this manner avoids the need to construct a slider which can withstand standard pull tests.

However, the solution of coupling the anchor to both the seat and vehicle  
5 requires the additional manufacturing step of affixing the anchor to the vehicle. This additional step often increases the cost associated with the assembly of the vehicle.

The present invention eliminates the need to attach one end of the strap to the vehicle floor by using a strap that is coupled to the seat frame and a lower  
10 location on the vehicle seat such as the base, riser, or dampener assembly.

The present invention accomplishes this by lowering the center of mass of the seat assembly below the sliders through the use of light weight components. This, in turn, results in the ability to safely anchor the seat by coupling the components together without the need to affix at least one end of the anchor to a  
15 non-seat component. Applicants have found that by configuring the seat in this manner permits the use of standard sliders since the structure that resists the force generated during a pull test is the suspension assembly rather than the sliders. Restraints are still used however to prevent the suspension assembly from hyper-extending during operation.

### **Description of the Drawings**

These and other features, objects and advantages of the present invention will become apparent from the following description and drawings wherein like reference numerals represent like elements in several views, and in which:

5        Figures 1 and 2 illustrate a typical prior art configuration.

Figure 3 is a perspective view showing one embodiment of the present invention.

Figure 4 is a perspective view of another embodiment of the present invention.

10        Figure 5 is a perspective view of another embodiment of the present invention.

### **Description of the Preferred Embodiments**

Set forth below is a description of what are currently believed to be the preferred embodiments or best examples of the invention claimed. Future and  
15 present alternatives and modifications to the preferred embodiments are contemplated. Any alternates or modifications in which insubstantial changes in function, in purpose, in structure or in result are intended to be covered by the claims of this patent.

As shown in Figures 1 and 2, a typical seat assembly 10 consists of a seat  
20 frame 11 which includes a back pan 12, seat pan 14, and an upper frame or base



16 and a pair of sliders 17A and 17B. A dampener such as a scissors assembly 18 and a lower base 20 are also provided. An anchor 22 is often affixed to the seat frame 11 and the floor 23 of a vehicle. To assist in meeting pull test requirements, as mentioned above, strap or anchor 22 is coupled to the seat and floor. This, of course often, adds additional steps and costs to the manufacturing process.

The present invention provides an apparatus and method which eliminates the need to anchor the seat assembly to the floor of a vehicle. As shown in Figure 3, the present invention provides a seat assembly 100 which includes a seat frame 111 that provides the necessary structure to support the seat which holds a rider. Seat frm 111 may include, among other things, sliders 117, a back pan 102, seat pan 103, a seat 104, and a first or upper section, frame, base, or member 106. A lower base, section, or member 110 are also provided. A dampening system such as a scissors assembly 108 is disposed between sections 106 and 110.

Typically, the components of the seat suspension are made from metal or steel. However, constructing the components in this manner results in the center of gravity or mass being located above section 106. To lower the center of gravity or mass down below section 106, such as where indicated in Figure 1 by arrow A, light weight materials are used to construct all or a portion of the seat frame. In one embodiment, components such as back pan 102, seat pan 103 and member 106 may be made of a lighter weight material than the metal typically used in the

construction of the seat. At a minimum, back pan 102 should be constructed in this manner. Materials that could be used in accordance with the above, include but are not limited to plastic, aluminum, fiberglass, magnesium as well as other strong, light-weight materials known to those of ordinary skill in the art. A most  
5 preferred material is magnesium.

Once the center of gravity or mass has been lowered, the need to connect the anchor to the floor of a vehicle may be eliminated. Instead, an end of the anchor may be attached to a number of different locations on the vehicle seat, so long as the point of attachment is below the attachment point on the seat frame.  
10 The use of an anchor or restraints adds a further level of safety. It prevents the seat assembly from hyper-extending which may reduce operator excersion and also reduce potential damage to the seat components.

For example, as shown in Figure 3, straps 112 and 113 may be connected to any point on seat frame 111, with a preferred located being based 106, and  
15 lower base 110. In another embodiment, as shown in Figure 4, straps 150 are affixed to seat frame 141 at upper base 144 and a portion of the dampener assembly 148. In yet another embodiment, as shown in Figure 5, straps 166 and 168 are connected to base 160 of seat frame 161 and a portion of a riser 170 which may be used with a seat assembly.

20 Common to all embodiments is the basic design criteria that the anchor be

affixed to a portion of the seat frame and to a point a spaced distance apart from and lower than the seat frame and sliders 117.

In addition, the tie downs, straps, or anchors described above are preferably flexible in nature. During periods of use, the distance between the base sections  
5 will vary due to the movement of the seat. This necessitates the use of flexible couplers such as straps or tie-downs so as to permit movement while still retaining the ability to couple the components together. Materials found to be suitable for the construction of the flexible coupler or connector include, but are not limited to, nylon strapping, chain, and cable.

10 By configuring the seat in this manner, Applicants have found that the seat can withstand standard pull test known to those of skill in the art, without the use of restraints. Applicants believe that this is accomplished by the use of lighter weight materials which lower the center of mass of the seat. This in turn, it is believed, results in the structurally strong components, such as the suspension  
15 assembly, providing the necessary resistance to the pull test forces rather than the weaker slides.

While the preferred embodiments of the present invention have been illustrated and described, it will be understood by those of ordinary skill in the art that changes and other modifications can be made without departing from the  
20 invention in its broader aspects. Various features of the present invention are set

forth in the following claims.

What Is Claimed is:

1. A vehicle seat comprising:

oppositely located upper and lower base sections and a dampener  
connected to and disposed between said base sections;

5 a seat pan;

a back pan; and

at least one flexible coupler connecting said upper base section to said  
lower base section.

2. The apparatus of claim 1 wherein said back pan is made of lighter weight  
10 material than said lower base section.

3. The apparatus of claim 1 wherein said back pan is made of magnesium.

4. The apparatus of claim 1 wherein said seat pan is made of magnesium.

5. The apparatus of claim 1 wherein said seat and back pan are made of  
magnesium.

15 6. A vehicle seat comprising:

a seat frame and oppositely located base;

a dampener connected to and disposed between said seat frame and said  
base; and

at least one flexible anchor for coupling said seat frame to said base.

20 7. The apparatus of claim 6 wherein a portion of said seat frame is made of a

light weight material.

8. The apparatus of claim 6 wherein said seat frame includes a back pan, said back pan is made of lighter weight material than said base.
9. The apparatus of claim 8 wherein said back pan is made of magnesium.
- 5 10. The apparatus of claim 6 wherein said seat frame includes a seat pan, said seat pan is made of a lighter weight material than said base.
11. The apparatus of claim 10 wherein said seat pan is made of magnesium.
12. A vehicle seat comprising:  
a seat frame and base located below said seat frame;  
10 at least one slider;  
a dampener connected to and disposed between said seat frame and said base; and  
said seat frame having a lightweight component which permits the seat to be used without restraints.
- 15 13. The apparatus of claim 12 wherein a component of said seat frame is made of magnesium.
14. The apparatus of claim 12 wherein said seat frame includes a seat pan.
15. The apparatus of claim 14 wherein said seat pan is made of magnesium.
16. The apparatus of claim 12 wherein said seat frame includes a back pan.
- 20 17. The apparatus of claim 16 wherein said back pan is made of magnesium.

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18. The apparatus of claim 12 wherein said seat frame includes a base:
  19. The apparatus of claim 18 wherein said base is made of magnesium.
  20. The apparatus of claim 12 wherein said seat frame includes a base, seat pan, and a back pan.
  - 5 21. The apparatus of claim 20 wherein said base, said seat pan and said back pan are made of magnesium.



Application No: GB0403835.2

Examiner: Alex Swaffer

Claims searched: 1-11

Date of search: 12 July 2004

## Patents Act 1977: Search Report under Section 17

### Documents considered to be relevant:

| Category | Relevant to claims   | Identity of document and passage or figure of particular reference                   |
|----------|----------------------|--|
| X,Y      | X: 1, 6 Y:<br>3-5, 7 | EP0530439 A2<br>(MILSCO): See figures 1 and 2, and column 7 lines 16-26.             |
| X,Y      | X: 1, 6 Y:<br>3-5, 7 | US6264163 B1<br>(BE-GE): See figure 1 and column 2 lines 52-57.                      |
| X,Y      | X: 1, 6 Y:<br>3-5, 7 | US5799922 A<br>(SEATING TECHNOLOGIES): See figures 1 and 2, and column 4 lines 7-10. |
| X,Y      | X: 1, 6 Y:<br>3-5, 7 | US4448386 A<br>(UOP): See figure 2 and column 3 lines 54-58.                         |
| X,Y      | X: 1, 6 Y:<br>3-5, 7 | US3957304 A<br>(SEARS): See figures 1, 3 and 4, and column 2 lines 50-56.            |
| Y        | 3-5, 7               | EP0881116 A2<br>(LEAR): See column 2 lines 12-16.                                    |
| Y        | 3-5, 7               | US6036266 A<br>(LEAR): See column 2 lines 12-17.                                     |

### Categories:

|   |  |   |   |
|---|--|---|---|
| X | Document indicating lack of novelty or inventive step  | A | Document indicating technological background and/or state of the art  |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category | P | Document published on or after the declared priority date but before the filing date of this invention.         |
| & | Member of the same patent family   | E | Patent document published on or after, but with priority date earlier than, the filing date of this application |

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>W</sup> :

A4L

Worldwide search of patent documents classified in the following areas of the IPC<sup>07</sup>





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The following online and other databases have been used in the preparation of this search report

EPODOC, WPI, JAPIO